

REMARKS

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Claim 9 has been amended to correct the spelling error.

The limitation relating to minimizing pattern distortion has been recited positively in the body of the claims where pertinent. This limitation has been removed from the preamble of the claims.

The Claims in the instant application define a two stage curing process using a closed mold, forming a soft or flexible elastomeric stamp, preventing permanent shrinkage and using specific polysiloxane oligomers-siloxane monomer elastomer reactive mix. These limitations are not found in the prior art.

The Examiner is respectfully requested to reconsider the rejection of Claims 1, 4, 7 and 8, under 35 U.S.C. 103(a) as being unpatentable over Muller et al. (U.S. Patent 5,770,140) taken with Ciullo's "*The Rubber Formulary*" in view of Domeier, et al. (U.S. Patent 6,422,528).

The object of the present invention is to form a microcontact printing stamp which possesses a minimum degree of printing distortion. The method of making the improved stamp of the present invention which stamp has a pattern for microcontact printing utilizes the siloxane composition noted above, wherein the siloxane composition is cured to fix its geometry while at or near the intended final use temperature which is room temperature, followed by a higher temperature step to harden the siloxane composition, without substantially inducing geometry changes to the stamp and the pattern.

Muller discloses a curable composition which contains a siloxane polymer, filler and a curing agent. Applicant's invention relates to a stamp which is used in microcontact printing. In the specification Applicant has emphasized the need for precise and exact dimensions of the stamp. Muller is not concerned with exacting specifications for whatever product he is producing. Muller cures his compound at 150°C to 170°C. Applicants ranges for cure are room temperature and between about 50 °C and 120 °C.

Muller's objective is not to form a stamp with fine definition that is needed to reproduce items, but rather he is seeking to accelerate the cure of siloxane elastomeric compositions but use of selected peroxides as curatives.

The pattern fabricated onto Applicant's stamp should represent in detail the desired pattern intended to be printed. While this concept may appear in general to be obvious, the extraordinary detail that must be conveyed with microcontact printing makes this faithful representation easier to state as a goal than to realize in practice. Note that the initial step of Applicant's cure requires up to one week to accomplish. This is diametrically opposite to the objective of Muller. He seeks a faster cure at a higher temperature. He also does not use a two step method and the fillers disclosed would not be useable in Applicant's final product.

The stamp, once made, must have mechanical properties, such as elastic modulus, that allow handling during printing, and minimum additional distortion from the stresses incurred during printing contact. While it is possible to do either separately, it has proven to be a severe fabrication challenge to achieve both simultaneously.

The Examiner has stated at several locations in the Official Action that "*by being in an enclosed mold, the retained mix therein will naturally maintain the precise dimension of the mold cavity.*" There is no foundation for this assertion by the Examiner. The disclosure of Muller and what the Examiner is asserting in the Official Action is disclosed by Applicant in his discussion of the prior art on pages 4 and 5 of the specification.

United States Patent 6,422,528 to Domeier et al. discloses a "sacrificial" plastic mold having an electroplatable backing. According to the reference, a softened or molten thermoplastic material is infused through a porous metal substrate and into the features of a micro-scale molding tool contacting the porous metal substrate. Subsequent steps call for electroplating and lapping, etc. There is no mention made of siloxane compounds or of a microcontact printing stamp in Domeier, et al.

The attention of the Examiner is respectfully directed to the fact that Domeier, et al. disclose as their matrix material, a *THERMOPLASTIC*, not a thermoset material. It is well known that "thermoplastics" soften under heat. *The Concise Chemical and Technical Dictionary*, Bennett, Chemical Publishing Company, (1986) at page 1126 states: "thermoplastic, softening under heat, a thermoplastic substance is adequately rigid at normal temperature and under ~~normal~~ conditions of stress but is capable of deformation under heat and pressure." Applicant's material, by virtue of its chemical structure is a thermoset material which: a material that will ~~undergo~~ has undergone a chemical reaction by the action of HEAT, catalysts, ultraviolet light, etc., leading to a relatively infusible state." (*Id.*)

A typical example of the materials used in Domeier, et al. includes poly(methyl-methacrylate), but not elastomeric organic/inorganic polymers of the siloxane type. These are very different materials from the siloxane rubber disclosed and now claimed by Applicant.

Note that Claim 4 covers the method of making a stamp for microcontact printing wherein the blend of polysiloxane oligomer-siloxane monomer elastomer reactive mix in said enclosed mold is a vinyl addition-type siloxane two-component mixture. Domeier, et al. have no disclosure of such a compound suitable for curing.

Contrary to Domeier, et al., the present invention comprises simple molding techniques with respect to microcontact printing stamps, to achieve both the required dimensional integrity for pattern faithfulness and desired mechanical properties, primarily high elastic modulus. It teaches that with the vinyl addition type siloxane precursor mixtures (and others), where crosslinking (curing) can take place at either room temperature or higher temperature, a two-step cure produces the desired combination of properties. This is not possible with Domeier, et al. in view of the materials disclosed therein.

The first step is a room temperature cure, since generally room temperature is the condition at which the stamp will be ultimately used. The stamp is allowed to crosslink at room temperature for some period, for example one week. During this period of time, the stamp crosslinks and fixes the overall stamp geometry and the printing pattern. This was never contemplated by Domeier, et al. as evidenced in the disclosure.

After this curing step is completed, a second step commences wherein the stamp is brought to a much higher temperature, of between about 50 °C and 120 °C, at which temperature a further cure continues thus attaining a higher elastic modulus. Upon cooling back to room temperature, the original pattern is restored without distortion and the stamp has the desired higher modulus. Again, Domeier, et al. do not have such a disclosure to prepare such a product.

The two-step processing described above is used with the intention of using the first step to establish the precise dimension of the molded pattern. The step establishes not just the relative geometry, but also the resulting dimension by being held at a precise temperature within an enclosed mold. Then, once this dimension has been irrevocably established, the material is heated to a higher temperature for hardening.

Even though the material will (and does) expand during the higher temperature curing, it will (and does) shrink back to its original dimension again after cooling to the final use temperature. Neither Muller nor Domeier, et al. disclose such a phenomenon with their respective final products.

With respect to the references cited to Muller and Domeier, et al., not only do these patents deal with entirely different processes, but the disclosures are directed to area totally different from the teaching objective of the present invention.

The references, especially Muller who does disclose a cure, say nothing about maintaining a precise dimension. Shaping by molding does not address the specific "dimension" which Applicants needs for his invention to function properly. Further, Applicant submits that assuredly the Muller formed articles parts will undergo significant shrinkage during the higher temperature (150 °C - 170 °C), regardless of the Examiner's unsupported contentions. Applicant's temperature range for the second cure step is well- below the Muller range for ~~cure~~.

The Examiner is requested to withdraw the Ciullo publication and the Domeier, et al references in view of the Declaration Pursuant to 37 CFR §1.131 which is attached hereto and hereby incorporated by reference herein. Applicant had conceived and reduced to practice the subject matter of the invention prior to the publication and filing dates of the respective references. The invention disclosure form (Exhibit 1 to the Declaration) was prepared when the invention was ready for evaluation by the committee which determines what inventions to file in the USPTO. Thus the invention was completed or it would not have been ready for filing.

Applicant respectfully submits that the specificity of the Muller and Domeier, et al. Rosato patent references and the Ciullo reference do not rise to the level required to qualify as an appropriate reference with respect to Applicant's invention.

Further, the reference must describe the applicant's claimed invention sufficiently to have placed a person of ordinary skill in the field of the invention in possession of it. (Citations omitted) In re Lonnie T. Spada et al., 911 F.2d 705, 708 (Fed. Cir. 1990)

There is no basis for combining the references as they are directed to totally different areas in the art.

In view of the amendments and cancellations made herein, Applicant believes that the claims are in condition for allowance. However if there are issues arising by virtue of this amendment which could be resolved by a telephone conference, Applicant's attorney would be pleased to speak with the Examiner concerning such matter(s) at a mutually convenient time.

The Examiner is requested to contact Applicant's attorney by telephone.

Respectfully Submitted,

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I hereby certify that this paper is being mailed via First Class Mail postage prepaid on the date listed below addressed to
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